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THE BREEDING BIRDS OF MALTA.

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BESIDES the paucity of trees and the want of many other conveniences indispensable for breeding birds, another reason why the number of our breeding species is so very limited, and nidification with the majority of these occurs rather sparingly, is assuredly want of protection.

The number of both licensed and unlicensed sportsmen and fowlers is so large that very few chances of breeding are given to the birds.

Such a thing as a close-season is not known in Malta, and yet, for some species, it is "a consummation devoutly to be wished" by all except the purely wanton sportsman.

This limited number of our breeding species may account for the fact that no one has ever been encouraged to take up the study of this branch of our ornithology; in fact, so far as I am aware, nothing has ever been published except a few occasional notes in Schembri's and Wright's catalogues; and of these some are probably given on the statements of very superficial observers.

I have often heard that nests of such species as the Nightjar, Hoopoe, Oriole, Bee-eater, Roller, etc., have been found, but the replies to my queries regarding site of nest, constructory material, number, colour, and size of eggs have invariably been so unsatis-

factory, that I feel justified in excluding them, at least for the present, from our list.

I began what I may call an idle collection of birds' eggs in 1898; this, however, gradually induced me to take a keen interest in our breeding species, and from 1900 I began to be more scrupulous and moderate in my collecting, and also to accompany such collections with the necessary notes; with the result that, omitting those which I have not yet seen myself, the list of the breeding birds of Malta to date has been brought up to thirty-two.

As will be seen from the list, it is difficult to fix the rate of nidification for several species; the rare Dartford Warbler, for example, nested freely enough in 1910-11, while the Corn-Bunting, which is one of our common residents and breeders, nested so sparingly in 1911 that I was not able to procure more than one nest.

Some species which once nested abundantly have now become so rare that I am afraid my having included them in this list might one day give rise to much controversy. Amongst these may be mentioned the Mediterranean Shearwater, which is being rapidly exterminated from these islands. Noteworthy also is the total absence of Marmora's Warbler in 1909, 1910, 1911, and 1914.

Before beginning my list I must say that I do not by any means pretend it is complete; on the contrary, I quite believe that it might easily be enlarged, especially if some species were speedily and seriously protected.

1. BLUE ROCK-THRUSH.

Monticola cyanus, Linn.—Merill.

This bird, being our best songster, is in great demand among bird-fanciers; consequently it is continually diminishing in numbers, and, though in 1911 it found a place on the list of the protected birds, it is still being robbed of its nestlings as it was before. Fortunately, the site which the bird selects wherein to build its nest is a crag in those inaccessible rocks overhanging the sea towards the south of the island, or high



up in some ruined building which it is impossible to climb without running the risk of being buried beneath it.

The nest is a rather bulky but loose structure of coarse roots and hay; both male and female take part in its construction, and they take from fourteen to fifteen days to complete it.

Nidification commences in March and lasts till the end of May. Two broods are generally reared in a season, the nest being sometimes partially, and sometimes entirely reconstructed for the second brood.

The eggs vary in number from five to seven, six, however, being the usual number. Their colour is a sky-blue, varying somewhat in intensity, some specimens being thickly spotted, others only sparingly, with reddish brown. A variety is sometimes met with having no spots at all.

2. WHITETHROAT.

Sylvia cinerea, Lath.—Beccafic ahmar.

The Whitethroat, which during some years visits us in considerable numbers, both in Autumn and in Spring, is by no means a common breeder; on the contrary, from my personal experience, I can say that it must be considered very rare.

I have found only four nests, all of which consisted of a light construction of dry grass; three of them had some horsehair and wool as an inside lining. In shape they were rather deep, and they were built in carob-trees at various elevations from the ground.

The eggs, from four to five in number, were of a greenish-white colour clouded with grey, and speckled all over with several shades of brown.

Three of these nests I found from the middle to the last week of April, and one during the second week of May.

3. GARDEN-WARBLER.

Sylvia hortensis, Bechst.—Beccafic.

This is a rather common Warbler which visits us during both passage-seasons, but especially in Spring. Every now and then a pair or two are found nesting.

The nest is usually built in the smaller carob-trees; it is a rather loose construction of hay and dried grass, with an inside lining of roots and horsehair; both the male and female take part in its construction, and it is ready in six or eight days.

The eggs, which vary from four to five in number, or sometimes even six, are of a stone-colour spotted with grey and several shades of brown; specimens are sometimes met with having very bold blotches.

I always found these nests in April, and do not know of a single case of their being found during other months.

4. SPECTACLED WARBLER.

Sylvia conspicillata, Marm.—Buchajla.

Of all our Warblers this is certainly the most common, being found also all the year round; as a breeder it must be considered as very common.

Though it also builds its nest in carob-trees, it seems to have a predilection for dwarf plants.

The nest is a fine compact construction of dried stalks of grass and fibrous roots, thickly interwoven with wool and vegetable down. The inside is generally lined with different kinds of hair and finer roots; on the outside rags and even bits of paper are sometimes found making part of the constructing material. In shape these nests are mostly deeply cup-shaped. Both male and female take part in their construction, which takes them from six to eight days to complete.

The eggs, which are very small, are from five to six in number; their colour is a light bluish-green or grey speckled with olive, and sometimes clouded with darker grey or light brown; the speckling often forming a zone about the larger end.

This bird is one of our earliest breeders, often beginning to nest by the middle of February, and goes on to the end of May. Two broods are usually reared during a season, though a third one is by no means a rarity.

Schembri says that this species arrives here in April but not in September, and that it nests here in May. Wright says that it builds its nest in the *Euphorbia dendroides*; I have never found, however, any bird selecting this plant in which to build its nest.

5. SARDINIAN WARBLER.

Sylvia melanocephala, Gmel.—Buswejda.

This bird is rather irregular in its visits, both in Spring and Autumn; during some years, however, it arrives in fairly good numbers, especially during the Spring, when it remains with us to breed.

The nest is usually built in trees; the bird, however, does not seem to be partial to any tree in particular. In fact, I have found nests in carob, almond, pomegranate, fig, and orange trees, and on two occasions also I found it in the vine.

In structure, too, these nests vary considerably, some being very compact and deeply cup-shaped, others very flimsy and flat; the construction-material consists of hay and several kinds of dried grasses, with large leaves on the outside, the inside being lined with fine rootlets and horsehair; nests are, however, often found having no inside lining at all.

Both male and female are employed in the construction of the nest, which is brought to completion in about a week.

The eggs, which vary in number from five to six, vary also greatly in colour; some are of a light grey colour speckled over with brown, others are of a bluish-white speckled with olive and purplish-grey; a third variety, which is common too, is pink or light red mottled over with chocolate or darker red; a fourth variety, which is the rarest of all, is of a pure white, sometimes very sparingly spotted with brown.

Nidification usually lasts from the beginning of March to the end of May, and two broods are usually reared during a season—sometimes, but very rarely, three.

It is rather curious that Wright says that he had never known this species to breed here.

6. SUBALPINE WARBLER.

Sylvia subalpina, Bonelli.—Ghasfur il harrub.

This species, which is generally a rare migrant during both seasons, nests here every now and then.

It usually chooses some low herbage wherein very skilfully to conceal its nest, which is constructed with dry blades of grass on the outside, and fine roots on the inside; here horse-

hair is often added as a lining. I could never make out how long the birds take to build it.

The eggs, generally five in number, very rarely six, are of a light greenish-white boldly speckled with olive-brown.

I found nests in March, April, and May.

7. ORPHEAN WARBLER.

Sylphia orphea, Temm.—Beccafic abjad.

Of this species, which is one of our rare Spring and Autumn visitors, I found five nests in 1907. All of them were built in the larger carob-trees, at a position somewhat elevated from the ground. Of these five nests, I must confess only one was identified from the sitting bird; the other four, however, being identical with it in shape, position, and construction-material, also in the size and colour of the eggs, I think I am quite justified in ascribing them to this species.

In structure these nests were rather loose, though cup-shaped, the material used in their construction being dried stalks of grass and fine roots; they were very sparingly lined with vegetable down, and one nest had some skeleton leaves of the thistle interwoven in the outside.

The eggs, four to five in number, were of a greenish-white speckled all over with light olive and grey, the markings being more confluent about the thicker end.

Two of the nests I found in April, the other three in May.

8. DARTFORD WARBLER.

Melizophilus undatus, Bodd.—Ghasfur tas'sigiar ahmar.

This very irregular and rare visitor was included in Schembri's catalogue on the authority of Dr. Grech Delicata, and the same fact was also reported by Wright. This rarity might perhaps be due in part to the bird's retiring habits, frequenting as it does dense foliage, and very seldom taking to flight, and thus easily escaping detection by even the keenest observer.

It seemed to be pretty common in 1910-11, during which years I found several nests, only three of which were identified from the sitting bird; the others, however, being identical with them in every respect, I ascribe them to this species. All of

them were very well concealed in shrubs growing in the thickest parts of valleys, especially at Wied Zembak. Their construction-material consisted of dried stems and withered blades of grass; roots were used in only two of the nests, but wool and vegetable down were found, though rather sparingly, in every one of them; in structure they were rather loose.

The eggs, from three to five in number, are of a greenish or yellowish white speckled over with light grey, olive, or brown; in some eggs this brown is conspicuously reddish, and the blotches are rather bold. I may add that the eggs were identical with several I received from Italy.

All the nests were found during April and May, except one, which was found in March. I could not make out if both male and female take part in the building of the nest, nor the length of time they take to complete it.

9. MARMORA'S WARBLER.

Melizophilus sardus, Marm.—Bufula.

This Warbler, which is fairly common, is to be met with in these islands during the greater part of the year. I remember, however, several years when I could not see a single specimen; during the years 1909–10–11, for example, I could not procure a single specimen, and so also in 1914.

The nests are usually built in the carob-trees, and are composed of hay and dried stalks of grass, lined with rootlets and sometimes horsehair on the inside. Both birds take part in the construction, in which they employ from eight to ten days.

The eggs, four to five in number, are of a pale greenish-grey speckled over with darker grey and brown, the specks very often forming a zone about the thicker end; some eggs are somewhat glossy.

Nidification lasts from the beginning of March to the middle of May.

10. GREY WAGTAIL.

Motacilla melanope, Pall.—Zacac tad-dell.

As a migrant this bird is fairly common, especially during the Autumn, and a few individuals often pass the Winter with us; these generally remain here to breed.

The site chosen for the building of the nest is a depression of the earth, usually under cover of some low herbage, and most frequently in the vicinity of water.

I have not been able to make out yet if both birds take part in its construction, nor how long a time they employ in completing it.

The material used consists of blades of grass and rootlets, fairly lined with vegetable down and hair.

The eggs, four to six in number, are of a greenish-white colour, speckled all over with darker grey and brown.

Nidification takes place from March to May, in which time two broods appear to be reared.

Both Schembri and Wright admit that this is one of our breeding species.

11. WOODCHAT SHRIKE.

Lanius auriculatus, Mull.—Cacciamendula.

This bird, which is a partial resident with us, was once very common; lately, however, it has greatly diminished in numbers, and seems to be constantly on the decrease. As a breeder, too, it was very common, but now it must be considered rare; so much so, that during the last three years I have not seen more than seven nests, and yet I searched for them most diligently.

The site chosen for the building of the nest is a forked branch of a large carob-tree, in a somewhat elevated position from the ground. Schembri and Wright say that the nest is often found in almond-trees; I have never found it, however, except in the Carob.

It seems that only the female is engaged in the construction of the nest, in which she employs from eight to nine days.

The nest is very neat and compact, being generally composed of a particular kind of plant, finely lined with the down of the same plant, and interwoven with wool.

The number of the eggs varies from five to six, the last, however, being the usual number. Their colour is generally white faintly tinged with greenish-blue, and boldly speckled with grey and brown, in the majority of specimens the blotches forming a very conspicuous zone about the thicker end; in some rare cases the eggs seem to have a faint gloss.

Nidification generally lasts from the beginning of May to the end of June, one brood being generally reared during a season.

12. GOLDFINCH.

Carduelis elegans, Steph.—Gardill.

This beautiful species, which visits us during both passage-seasons, is generally scarce. I remember some years, however, in which it arrived in considerable numbers.

Both Schembri and Wright admit that it has been known to breed here, and though I have been assured by several persons that a nest or two are found nearly every year, I have only seen one myself. This was built in a small tree in one of the large gardens in the vicinity of Siggiewi; in structure it was very compact and deeply cup-shaped. The material composing it was the common moss found growing on the trees in the same garden, fine grass, and rootlets; the whole was interwoven with wool and what was most probably thistle-down. On the inside it had a lining of horsehair.

I was told that the nest was built in eleven days, but I could not find out if both male and female took part in its construction.

The contents of the nest consisted of four newly hatched birds and an addled egg. The colour of this egg was white faintly tinged with blue, spotted all over with reddish brown, the spots being more confluent about the larger end.

The nest was found on May 21st, 1913.

13. SERIN-FINCH.

Serinus hortulanus, Koch.—Apparell.

Though the Serin is a fairly common migrant during the Autumn, and in some years is seen in very large flocks, which generally remain throughout the Winter, it seems to be only an accidental breeder in these islands. It would perhaps breed more frequently if it were not so much persecuted, and destroyed in such great numbers by means both of the clap- and bat-nets.

The only nest I have found myself was built high up in a large carob-tree at the bottom of Wied Dalam; it was a rather

compact structure of hay interwoven with wool and goat's-hair, and having an inside lining of vegetable down and a few feathers.

I could not make out how long the bird took to complete it, nor if both sexes took part in its construction.

It contained five hard-incubated eggs, which six days later hatched; the colour of these eggs was a faint bluish-white, very sparingly spotted with dark-brown; purplish-grey spots were noticeable about the larger end.

This nest was found on May 4th, 1910.

I was told that in April, 1914, another nest was obtained from the same locality by a local egg-collector.

14. GREENFINCH.

Ligurinus chloris, Linn.—Verdun.

As a bird of passage the Greenfinch is usually common, but as a breeding bird it is here exceedingly rare. It generally begins to arrive towards the first week of October, and continues till late in November. Fresh arrivals are often noticed in January; towards March, however, all of them depart.

Though I have often heard from other observers that its nests are sometimes found, I have only succeeded in finding but one myself, and this was in May, 1910. It was built in an olive-tree at St. George's Bay (San Giorgio a Mare); in structure it was rather bulky but neat, being composed of hay, withered leaves of the common wormwood, and some fine straw on the outside, the inside having a lining of fine rootlets, hair, and a few feathers.

Both sexes took part in its construction, which they completed in ten days.

The eggs were four in number, their ground-colour white, very faintly tinged with blue and spotted with reddish brown, more confluent about the thicker end.

15. SPANISH SPARROW.

Passer hispaniolensis, Temm.—Ghasfur tal beit.

This is the Common Sparrow of Malta, and certainly our most common breeder too; it builds its nest in holes of walls, in fissures of rocks, and sometimes also in trees, both out in the country, in villages, and in towns.

The nest is a very rough and bulky structure of straw, hay,

grass, feathers, rags, wool, and paper ; in fact, everything seems good for this bird to add to the bulk of its nest.

Both sexes are employed in the construction of the nest, which is completed in a period varying from seven to twelve days ; the same nest is usually used for a second, and sometimes even a third brood during the same season.

The eggs vary in number from four to six, five, however, being the usual number ; their ground-colour varies from a pure white to a dark-bluish or greenish-white, speckled over with greyish- and blackish-brown spots and blotches ; some specimens are covered all over with these blotches, while others are found having no markings at all.

Nidification lasts from the end of January to the end of July or beginning of August, and so prolific are these birds that as many as four broods are often reared in a season. In spite of this, however, so persecuted are these birds that it has often been felt that their temporary protection was desirable.

In September the majority of these birds migrate, and return by the beginning of March, so that the early breeders are certainly those which have passed the Winter with us.

I have seen a nest containing five unfledged birds during the last week of October, 1915, a fact surely of very rare occurrence.

16. LINNET.

Linota cannabina, Linn.—Giojjin.

The Linnet is one of our most abundant birds of passage during the Autumn ; by the middle of October the first arrivals are noticed, and towards the beginning of November the country is literally full of them. Both the clap- and the prohibited bat-nets are now used to such an extent that the numbers of the birds are quickly and greatly reduced, the poor Linnets being taken and slaughtered by thousands. Thus when Spring arrives only a few pairs are to be seen, and these generally nest, very often to be robbed of their nestlings too.

I have found the nest always in the carob-trees, though I have been assured that it is sometimes built in the ivy and other climbers.

Both male and female are employed in the construction, which they generally complete in about eight days.

In structure, with only a few exceptions, the nests are rather loose; so loose, in fact, that it is very difficult to keep them in shape once they have been detached from the branches. The material used is hay and withered blades of grass; rootlets, hair and vegetable down, though very sparingly, are often used as an inside lining.

The eggs, four to five in number, are white, speckled over with purplish-brown. I noticed some nests in 1910 in which the eggs were conspicuously blue.

The breeding season for the Linnet in Malta generally lasts from the middle of March to the middle of May. The earliest date on which I found freshly-laid eggs was March 8th.

17. CORN-BUNTING.

Emberiza miliaria, Linn.—Durrajsa.

The Corn-Bunting is one of our common resident and breeding species. It was much more abundant a few years ago; its present diminution being perhaps due to the great demand for its eggs among dealers on the continent. In February fresh arrivals are often noticed.

The nest is usually placed on the ground in a depression of the soil under cover of some dwarf herbage, very often amongst the withered leaves of the *Asphodelus ramosus*. Sometimes, but very rarely, it is found on the lower branches of the carob.

Both sexes take part in its construction, which they complete in nine or ten days.

The nest is rather bulky, but neat and compact; it is made of fine roots on the outside, having an inside lining of horsehair. In nests which are found not far from the seashore seaweeds are generally found as part of the construction-material.

The eggs vary in number from four to six, the last being, however, the usual number. In colour they vary from a delicate creamy-white to almost a light reddish-brown, speckled over with brown and black, and often having very irregular scribbings, which are generally more confluent about the thicker end.

Nidification lasts from the middle of February to the end of May.

18. THE SHORT-TOED LARK.

Calandrella brachydactyla, Leisl.—Bilbla.

With the exception of the Sparrow this is certainly our most common breeder. The first arrivals are noticed by the beginning of March; the bulk of the birds, however, are not seen before April, when great numbers are taken by means of the clap-nets.

The nest is always placed on the ground in a depression of the soil under cover of a thistle or some other small plant. Arid localities are generally chosen. The colour of both eggs and nest harmonises so well with its surroundings that the nest is very difficult to be detected, even by the most experienced collector.

I could never find out if both sexes work at the nest, nor the time they employ in its construction.

The material used for the making of the nest is usually very scanty, and consists of roots and grass very roughly put together; in nests found not far from the seashore the same seaweed (*Caulinia oceanica*) used by the Bunting is frequently noticed too.

The eggs vary in number from three to five, very rarely six; their colour is a fine creamy-white or a dirty clay, clouded and speckled all over with several shades of brown, olive, and grey, some having a zone of these spots about the thicker end; some eggs are noticed having a rather conspicuous gloss. In shape the variation is also great. Specimens are found which are quite spherical, while others are markedly elongated; great variation is at times noticed even in the same clutch. Nidification commences late in April and goes on till the end of July.

19. LESSER SHORT-TOED LARK.

Calandrella minor, Cab.—Bilbla secunda.

This Lark is by no means common in Malta; it seems, however, that the few individuals which arrive in April together with the preceding species remain here to breed.

The site and construction of the nest are identical with those of its larger ally, and the colour and often the size of the eggs are also the same, so that sure identification can only be had by

also taking the sitting bird. I have often found eggs of the Short-toed Lark even smaller than those of this species.

The period of nidification lasts also from the end of April to the end of July.

20. JACKDAW.

Corvus monedula, Linn.—Ciaula.

It is said that in other countries few are the places where the Jackdaw cannot find a home. Well, it must be said that in Malta few are the places where it can find one, such is the persecution the poor bird suffers all the year round, and during the breeding season especially.

The very limited number of birds which still remain nest in the crevices of the inaccessible cliffs overhanging the sea towards the south of the islands. A few years ago, however, these birds could be found nesting in old steeples and towers, and even in holes in the old battlements surrounding the towns. I remember also the time when the Jackdaws could be seen on the roofs of houses in the centre of Valletta.

Both sexes take part in the construction of the nest, which they complete in about a fortnight.

This nest is a rough structure of straw, hay, and some feathers, wool and hair being also found at times.

The eggs vary in number from four to six; in colour they are of a pale greenish-blue, mottled over with light and dark brown spots, some specimens very thickly, others only sparingly. I have seen specimens very boldly blotched.

Nidification lasts from the beginning of April to the beginning of June, and only one brood appears to be reared during a season.

If speedy protection is not afforded to this bird I am afraid that its extinction as a breeding species in Malta will be a question of the very near future.

21. SWIFT.

Cypselus apus, Linn.—Rundun.

The Swift, which is one of our commoner birds of passage, and also a partial resident, may be also considered a pretty

frequent breeder. If one can judge by the great number of birds which during the breeding-season are seen flying about the southern cliffs, and entering their crevices at intervals, it must be said that the Swift is one of our more common breeders.

The only nest I ever procured was taken from a crevice in the precipitous cliffs close to Ghar-Hassan (Hassan's Cave) in May, 1909. It was composed of straw, hay, feathers, and some cotton; I cannot say what its shape was like, as it was brought out in pieces.

Both sexes take part in the construction, which, I have been assured, is sometimes completed in so short a time as four days; sometimes, however, so long as ten or eleven days are taken to complete it.

The eggs, two in number, and very conspicuously elongated, were of a dirty white, seemingly spotted; these spots were, however, easily removed by means of a little rubbing.

22. SHORT-EARED OWL.

Asio accipitrinus, Pall.—Omm-is-subien.

This Owl is one of our common visitors during both seasons; its nesting here, however, must be considered an event of very rare occurrence, though it has also been recorded as a breeder both by Schembri and Wright.

The first time I saw a nest was on May 4th, 1906; it contained five young, and was found in the vicinity of Siggiewi in a depression of the soil under a tree. On May 18th I found another among the low grass at the bottom of Wied Znuber. It contained three eggs, which were of a pure white colour, having a very faint gloss; in size they were a little larger than Pigeons' eggs, and more spherical in shape.

23. BARN-OWL.

Aluco flammeus, Linn.—Barbagianni.

Though by no means common, this Owl being sedentary, one or two of its nests are found nearly every year; unhappily, however, it is being most rapidly exterminated, and I am

inclined to think that the nests which are found belong to birds which have but freshly arrived.

The site chosen by this bird wherein to nest is usually a deep crevice of the high rocks on the south of the island, or in the more unfrequented parts of some of our valleys.

The same nest is generally used again, not only during the same season, but for many successive years.

I have never been able to examine a nest myself, but I have been told that very little or no material at all is used, the chalky-white eggs, two or four in number, being often laid on the bare earth. The breeding of the Barn-Owl in the ruined walls of Valletta and the three cities (which both Schembri and Wright mention), must be considered now a thing of the past.

The breeding-season commences in April, and freshly-laid eggs have been found even as late as the beginning of August; and more than one brood is generally reared.

24. HOBBY.

Falco subbuteo, Linn.—Seker tal hannieka.

The Hobby, which is usually a common visitor during both passage seasons, but especially during the Spring, has been known, though rarely, to nest here.

I obtained one nest on May 12th, 1910.

The material of which it was composed consisted of old straw, small twigs, and some very dirty feathers belonging to domestic birds.

The eggs, three in number, are of a creamy-white colour, so thickly mottled over with light red and brown as to hide the ground-colour almost entirely, and thus give them the appearance of a uniform light red mottled over with several shades of brown.

I am inclined to think that this is the Falcon alluded to by Schembri and Wright as being a resident and breeder here, and not the Peregrine, which is here very rare.

25. KESTREL.

Falco tinnunculus, Linn.—Spanjulett.

The Kestrel is one of the most common species of its genus which visits us during both passage-seasons, and it might be

considered also one of our resident species, as a few individuals are to be met with all the year round. Its nests, though not common, are to be found every year.

The site chosen by the bird wherein to nest is generally a crag in the cliffs overhanging the sea towards the south of the islands; the material used being identical with that employed by the foregoing species. Some observers are of opinion that the Kestrel often uses the nest of the Jackdaw after having compelled its owner to desert it. When it really makes a nest for itself, both male and female seem to take part, and they generally employ from six to fifteen days to complete it.

Nidification commences rather late. I have never seen a nest earlier than in May. The young seem to leave the nest by the end of June.

26. ROCK-DOVE.

Columba livia, Bonn.—Hamiema tal gebel.

This is one of our resident birds; it is, however, by no means common. Evidently Wright, who says that it breeds in considerable numbers, was not aware that the bulk of the birds which are seen about the southern parts of the islands are nothing but escaped examples of the several varieties of our domestic pigeons.

The site chosen by the Rock-Dove wherein to nest is generally a crag or a cave in the high southern cliffs.

Both sexes take part in its construction, which they complete in a period varying from six to ten days. The nest seems to be used not only for several broods but for several successive years.

No description of nesting-material or eggs is needed, as these are quite identical with those of the domestic pigeon.

I fear that it is difficult to fix the length of the nesting period, though some observers are of a persistent opinion that it lasts from March to July.

27. QUAIL.

Coturnix communis, Bechst.—Summienna.

Undoubtedly the Quail would be one of our more common breeders if it were not so much persecuted; unfortunately,

however, it is so eagerly sought for that very few chances of breeding are left to it.

The nest consists simply of a depression of the soil, mostly scratched out and enlarged by the bird itself, and practically no material whatever is used as a lining. The site chosen is usually in the sulla or corn fields.

The eggs, often sixteen in number, and sometimes more, are of a creamy-yellow colour, spotted with chocolate and several other shades of brown; in some specimens the markings are rather minute; in others, however, they consist of very bold blotches, some of which are of a size as to cover, say, an eighth of the egg.

Nidification usually commences in March; I have seen, however, eggs still unhatched in June.

28. STONE CURLEW.

Edicnemus scolopax, S. G. Gmel.—Tellerita.

This bird is one of our common migrants during both passage-seasons, and may be considered also a partial resident, as a few individuals may be met with almost all the year round.

I must confess that I doubted for a long time about the truth of the statement that this bird is to be considered one of our breeders. On June 26th, 1909, however, a bird in down was brought to me; it was taken about the barren rocks between "tal Mara" and "Ghar Hassan." On June 2nd, 1911, two freshly-laid eggs were also brought to me; they were found at "Gzira," another barren locality in the vicinity of Siggiewi.

I have never seen a nest, but I have been told that the eggs are simply laid in a depression in the ground, with no material beneath save the bare earth; and I have been also assured that at "Marfa" the same spot is used by the birds for nesting year after year.

In colour the eggs are of a dirty ochre mottled all over with several shades of brown, and having also some very distinct streaks of this colour.

29. SOUTHERN HERRING-GULL.

Larus cachinnans, Pall.—Gawwija prima.

This fairly common bird is to be considered as one of our

constant breeders; it seems, however, to breed more commonly in Gozo than in Malta.

The site of the nest is generally a crag or a shelf of the cliffs overhanging the sea, the material used consisting of sticks and seaweeds; the nest is sometimes very bulky, but always roughly and loosely constructed.

The eggs, from two to three in number, are of a yellowish clay-colour, blotched with olive and several shades of brown; in some specimens the markings are very bold, thus giving the egg a very beautiful appearance.

Nidification generally takes place from March to May, and only one brood seems to be reared in a season.

The young in down are often taken and exposed for sale on the square opposite St. John's Cathedral; being very susceptible of domestication they are often kept as pets, and can be seen strolling about the streets. One or two are often to be seen also in our public gardens.

(This is, of course, the *Larus argentatus* reported in Wright's catalogue.)

30. STORM-PETREL.

Procellaria pelagica, Linn.—Cangiu ta Filfla.

This is a rather abundant species, and, being also resident, it is to be considered common as a breeder too. Though it is stated to be found only on Filfol (hence its Maltese name), I have no hesitation in saying it is to be met with all around the Maltese islands. Its true breeding station, however, is really the islet of Filfol; there it lays its single egg in the deep crevices of the rocks, or under the large stones, whence it is very difficult to get it.

The egg is white, smooth, and without any gloss, sometimes spotted over with minute reddish spots, which are generally more confluent about the thicker end, where they often form a zone.

Sometimes two birds or more select the same crevice in which to lay each its single egg; this fact has led some observers to think that this petrel lays more than one egg.

Very little or often no material at all is used, and the egg is simply laid on the bare earth.

The breeding-period lasts from May to the end of July or the beginning of August.

31. LEVANTINE SHEARWATER.

Puffinus yelkouanus, Acerbi.—Garnia.

This species, reported in both Schembri's and Wright's catalogues as the Manx Shearwater, is one of our sedentary species. It was once rather common, but has now become rather scarce.

The site chosen by the bird for nesting is a deep crevice or one of the rabbits' burrows so frequent along the southern coast of the island.

A single egg is laid, which is of a pure chalky-white colour; in size it varies considerably; this variation equals that of the eggs of the domestic hen, and as such it is often offered for sale.

The breeding-season of this species commences towards the beginning of April and goes on till the end of May.

Often more than one egg or nestling is found in the same burrow; these are certainly, however, the produce of two or more females.

32. MEDITERRANEAN SHEARWATER.

Puffinus kuhli, Boje.—Ciefa.

This species, which was once very numerous, has been much reduced in numbers, so much so that its extermination here, unless something is done to protect it seriously, will be a question of the very near future.

The bird used to breed most freely on all the islands composing this group, and on Filfolà, their chief breeding station, they could be found breeding in hundreds, not to say thousands.

The single chalky-white egg is laid in a depression of the soft turf under the shelter of some large stone or in a crag in the rocks; sometimes it is simply laid on a sort of thick low herbage found growing all along the cliffs overhanging the sea, and especially on Filfolà.

In size this egg is a little larger than that of the foregoing species, but, like it, it also varies considerably.

It is generally laid towards the end of May or the beginning of June, that is, about two months later than that of the Levantine Shearwater.

NOTE.

Besides the thirty-two species just mentioned the following have also been noted as breeding here; this, however, I have not yet been able to confirm :

(1) The Bee-eater, reported by Schembri on the authority of others, the same statement being repeated by Wright.

(2) The Kingfisher, reported also by Schembri in a somewhat vague manner.

(3) The Roller, reported also by Schembri, who had heard that it bred once.

(4) The Turtle-Dove, reported by both Schembri and Wright in a rather doubtful manner.

(5) The Sandpiper, reported by Wright, who says that "it probably breeds here."

THE PHARYNGEAL TEETH OF FISHES.

BY COLONEL C. E. SHEPHERD (Indian Army).

(Concluded from p. 73.)

LOPHIIDÆ.

Lophius budegasa, a Mediterranean fish of the "Angler" description. The upper pharyngeal teeth show as three rows of strong cardiform teeth, the two upper rows being larger than the lowest and third row. The lower pharyngeal teeth are in two elongated groups, each forming a V, the point of which is towards the tongue; there are prominent upstanding cardiform teeth marking each line of the V, and there is a broad space between the V's in the middle line; the apices of the V's converge towards the front of the mouth (fig. II. 3, p. 71).

Lophius piscatorius, the Angler or "Fishing Frog," found on the English coast, has its upper pharyngeal teeth likewise in three rows. The top row, on the head of the second epibranchial, has strong cardiform teeth, the second row, on the head of the third epibranchial, has still stronger teeth, and the third row, on the head of the fourth epibranchial, is of smaller teeth; all, however, being cardiform. The lower pharyngeal teeth are similar to those described for *L. budegasa*.

MOLIDÆ.

Orthogoriscus mola (the Sunfish), has the upper pharyngeal teeth in three rows each side of long, slender, but imposing-looking cardiform teeth. A specimen can be seen in the annexe, off the Central Hall, devoted to details of the anatomy of fishes, at the British Museum of Natural History.

Paradoxical as it may appear, the subject of the pharyngeal teeth of fishes would not seem to be completely dealt with without some mention of those families of fishes which are devoid of such teeth.

POLYPTERIDÆ.

Polypterus senegalus, a fish found in the rivers of West Africa. A few flat, tubercular patches with very fine villiform teeth on the outer and inner sides of the first three arches represent all that this fish has for gill-rakers. There are no pharyngeal teeth (fig. III., 1).

ACIPENSERIDÆ.

Acipenser sturio, the Sturgeon, has twelve short, horny gill-rakers on the first cerato-hypobranchial, with six on the epibranchial. They are placed low down on the outside of the arch instead of standing on the upper edge. The longest is one-fifth of the depth of the gill-laminæ below it; these gill-rakers stand up distinctly apart from each other. The inside of the first arch, and both sides of the second, third, and fourth arches, have short, upstanding, horny gill-rakers much more numerous than those on the outside of the first arch, the inside of this having twenty-two gill-rakers; they are, however, less broad in structure, and stand out like a row of little pegs. There are no pharyngeal teeth.

CERATODONTIDÆ.

Neoceratodus forsteri, a fish that breathes by lungs as well as by gills, is found only in two or three rivers of Queensland, Australia, and said to be getting extinct there. It is called locally the "Flat-head," also "Burnett" or "Dawson" Salmon, according to the river in which it is caught. It has sixty-two short, fleshy gill-rakers from the extremity of the first epibranchial to the end of the first hypobranchial. The angle not being clearly defined, the total number is noted. The longest are only one-tenth of the depth of the gill-laminæ below them. There are forty-two similar gill-rakers on the inside of the hyoid bone, shown opened back in the illustration. There are similar gill-rakers on each side of the gill-slits, those on the inner sides being longer than those on the outside. The upper surfaces of the arches are covered with fleshy papillæ of a bluntly-pointed shape, those on the first arch being triangular. At the junction of the hypo- with the basibranchial are bigger, broader, but still pointed papillæ. The upper back part of the gullet is marked with corrugations that fit over the gill-slits, and the whole

surface of the back part of the gullet is covered with papillæ which are more thickly congregated just above the œsophagus (fig. I.).

MORMYRIDÆ.

A family of fishes found in the Nile and other rivers of tropical Africa.

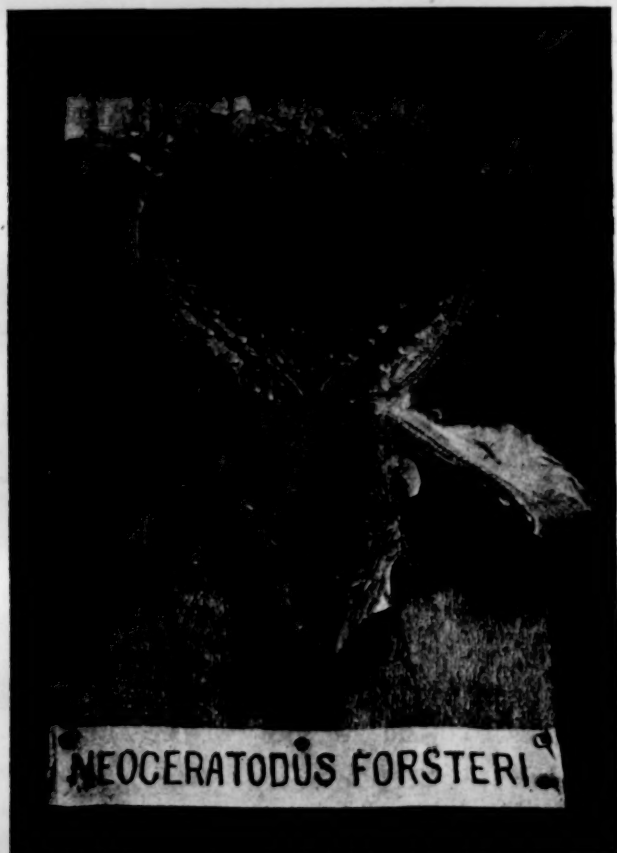


FIG. I.

Mormyrus kannume, from the Nile, has only five small gill-rakers on the first cerato-hypobranchial arch, with four very minute ones on its epibranchial. There are also minute gill-rakers on the inside of this arch. Both sides of the second and third arches and the outside of the fourth arch carry minute but more numerous gill-rakers. There is a long strip of minute teeth on the tongue up to the junction of the second gill-arch.

Hyperopisus bebe, also a Nilotic fish, has thirteen minute gill-rakers on the first epibranchial. There are no gill-rakers on the cerato-hypobranchial of the first arch, nor on the other arches. There is a set of granular teeth on the tongue, arranged at the forward end as the seeds of maize on an Indian corn cob; at the hinder portion of the tongue these teeth are arranged in an outer circle with an inner area of mucous membrane. The palate of this fish is covered with a strong bony plate that has rounded teeth studded on it, against which the teeth on the tongue engage.

HYODONTIDÆ.

Hyodon alosoides, a fresh-water fish, the Mooneyes of Canada, has eight short, thick, horny gill-rakers on the first cerato-hypobranchial arch; these are not teeth-bearing. There are four on the epibranchial. The longest of the gill-rakers is, in length, just under one-third of the depth of the gill-laminæ below it. There are short, thick gill-rakers on the inside of the first arch, and the inner and outer sides of the other arches. There are no upper or lower pharyngeal teeth. There is a strong cardiform tooth on each side of the tongue near the tip, with a smaller, similar tooth near the œsophagus, and other teeth buried in mucous membrane along the centre of the tongue; and on the basibranchials near the tongue a broad, depressed band of asperities.

Hyodon tergisus has only four gill-rakers on the cerato-hypo-portion of the first branchial arch, similar to those described for the last fish. All the other remarks made as to pharyngeal teeth and teeth on the tongue apply equally to this fish.

OSTEOGLOSSIDÆ.

Osteoglossum bicirrhosum, the "Aroowana" of British Guiana, has twelve long, horny gill-rakers on the cerato-hypo- of the first branchial arch, with ten on the first epibranchial. The longest of the gill-rakers, the second to the sixth from the angle, are about twice the length of the gill-laminæ below them; for the size of the fish it has very short gill-laminæ. The inside and outside of the other arches, as also the outside of the fifth arch, all bear gill-rakers shorter than those of the first arch, and

decreasing in size as they go inwards. All the gill-rakers bear teeth. There are no pharyngeal teeth. There is a small, elongated, narrow group of villiform teeth on the upper part of the limb of the fourth epibranchial, and two moderate-sized narrow plates on the fifth arch of villiform teeth; against these the teeth on the fourth epibranchial work. A long plate of



FIG. II.

OSTEOGLOSSUM BICIRRHOSUM.

teeth extends from the tongue to the junction of the third hypobranchial with the basibranchials. There is a curious leathery pouch under the forward part of the mandibles, very distensible, which makes one think of a Pelican when one looks at this fish (fig. II.).

Arapaima gigas, the Arapaima of British Guiana, and called

"Pirarucú" at Manáos on the Amazon, where it is caught in large numbers. This fish is the largest of fresh-water fishes, and said to grow to twelve feet in length; portions of one five feet nine inches in length were obtained. The basibranchials at the base of the tongue have a bony structure covered with small conical teeth set very closely together; it is eight inches in length by one and five-eighths inches in breadth in the centre. One end is rounded, the other terminates in a narrow ellipsoid shape; at this end the teeth disappear or become so minute as not to show as teeth, leaving the surface, however, very rough. This bone is used by the natives of the country where the fish is caught as a grater. On the parasphenoid, under the skull and above the "grater" bone, there is a group of similar teeth of an elongated oval shape, which is some five inches long and one and two-fifths inches wide, at its widest, of closely-set, palpable teeth, which then continue as a narrow band to the vomer. These fishes have no pharyngeal teeth, but those described above supply an efficient masticatory arrangement in their default.

CLUPEIDÆ.

This family, to which the Herring belongs, supplies a large number of excellent fish for the table.

Clupea finta, the Twait Shad, has twenty to twenty-one long, horny gill-rakers on the cerato-hypo- of the first branchial arch; the first ten from the angle keep much of a size, and are in length equal to the depth of the gill-laminæ below them. In one specimen examined there were twelve on the right epibranchial and nine on the left one. All the gill-rakers are smooth. Pharyngeal teeth, upper and lower, are wanting. The other branchial arches carry similar long gill-rakers on their outer sides only. These long gill-rakers make a good filter for the mouth (fig. III., 2).

Clupea harengus, the Herring, has forty-two long, fine, horny gill-rakers on the cerato-hypo- of the first branchial arch; they are serrated on the inner edge. In length the longest one, near the centre of their number, is one half as long again as the gill-laminæ below it. The forty-two are contained in a length of one and three-sixteenths of an inch, so that approxi-

mately there are thirty-five to the inch. There are eleven on the first epibranchial. Long gill-rakers only grow on the upper surfaces of the first four arches; they stand up and lean across the gill-slits. Those on the first arch stand up and keep all food inside the mouth, those on the upper surfaces of the second, third, and fourth arches close the gill-slits next outside of them. The fourth gill-slit is closed by small gill-rakers growing from the inside of the fourth and outer side of the fifth branchial arches. The gill-rakers on the second, third, and fourth arches



FIG. III.

POLYPTERUS
SENEGALUS.

CLUPEA
FINTA.

TETRODON
RETICULARIS.

are long and fine; similar ones grow on their epibranchials. The whole forms an excellent filtering apparatus, which, considering the fine nature of the Herring's food, is essential. Here, again, reference may be made to the Fisheries Investigation cabinet in the hall of the British Museum of Natural History, where some of the minute organisms on which the Herrings subsist are displayed.

Clupea ilisha, called the "Pulla" in Scinde and the "Hilsa" at Calcutta, is much esteemed for the table. It has on the first branchial arch from the angle to the end of the hypobranchial

at least 210 long, thin, horny gill-rakers; these stand on a length of two and five-sixteenths of an inch, so average just over ninety-one to the inch; the longest one is one-half longer than the gill-lamina below it; the gill-rakers are smooth, delicate, easily broken off. They are equally thickly set along the epibranchial, which in this fish is a longer bone than usual, its length being about two-thirds that of the cerato-hypobranchial. The gill-rakers spring from the top surfaces of the branchial arches, and there is only one row of them. The gill-rakers of the other arches are of the same kind, but not so long as those on the first arch; they diminish in length as they grow on the arches nearer the centre of the mouth. The top edge of the first arch is at a higher level than that of the second, and so on, so that the cavity of the mouth resembles a deep basket. The gill-rakers of one arch fit up against the side of the next outward arch, and the whole apparatus forms a perfect filter. The fifth branchial arch, the pharyngeal bones, are devoid of teeth; and instead of lying flat at the bottom of the mouth, they are inclined to one another at an angle upwards; the object of this will be seen presently. From the surface of the first branchial arch to the floor of the mouth is a depth of about three-fourths of an inch. The epibranchials and the connected tissues form a mass, giving the general idea of the plug of a wooden lemon-squeezer; in this mass, on the middle line in front, is a deep cleft; this fits on the upstanding angle of the pharyngeal bones; the action is to squeeze the water in the buccal cavity to the right and left, forcing the water through the gill-rakers, leaving the particles of food, which are minute, in the gullet. To aid in this action there is a pronounced flange under the parasphenoid bone that reinforces the squeezing mass.

Engraulis encrasicolus, the Anchovy, has thirty thin, horny gill-rakers on the cerato-hypobranchial of the first arch, with twenty on the epibranchial.

GYMNOTIDÆ.

Sternopygus macrurus, one of the *Gymnotidæ* from British Guiana, has five tubercle gill-rakers on the first cerato-hypobranchial arch, and one developed with two rudimentary on the first epibranchial. There are gill-rakers on the inside of the

first, both sides of the next three arches, and on the outside of the fifth arch. Those on both sides of the second and third arches are more numerous than those on the outside of the first arch. All the gill-rakers fit alternately and closely, making a good filter. There are no pharyngeal teeth, upper or lower, to be seen or felt. The mucous lining at the back of the mouth is covered with papillæ.

Eigenmannia virescens, another of the *Gymnotidæ* from British Guiana, has seven tubercle gill-rakers on the first cerato-hypobranchial, with three on the epibranchial. Under a fairly high-power microscope, hair-like bristles are seen protruding from these tubercles; they bend over at the extremity, looking like small claws. There are no pharyngeal teeth, either upper or lower, to be felt or seen. The mucous membrane at the back of the mouth is seen to have a corrugated surface when it is magnified.

ASPREDINIDÆ.

Aspredo sicuephorus has seven upstanding but soft gill-rakers on the first cerato-hypobranchial arch, with two on the epibranchial. Similar but more numerous ones are on both sides of the second, third, and fourth arches, with shorter ones on the outside of the fifth arch. The longest of the gill-rakers is about one-third of the depth of the gill-lamina below it. A prominent ovoid pad, standing well up, of mucous membrane, is on the heads of the third and fourth epibranchials, but no teeth could be seen or felt. Neither could any be found for the lower pharyngeal teeth.

MUGILIDÆ.

The pharyngeal teeth described in this series of articles have always been such as could be plainly seen or felt. It is a debatable question whether the cilia-like processes on the mucous surface of the upper pharyngeal bones—for instance, in *Mugil braziliensis*—are technically teeth or bristles; as they are, however, to be seen only when highly magnified and are not palpable to the touch, the *Mugilidæ* have been put into the category of fishes not having pharyngeal teeth. The same reason caused the inclusion of the two *Gymnotids* above described, as also that of the *Aspredo*. The family of the *Mugilidæ* provides many excellent fish for the table.

Mugil braziliensis frequents the eastern coast of South America. The specimen examined came from Demerara, where it is called the "Queeriman." The gill-rakers are very numerous in this fish; from the top of the epibranchial to the extremity of the hypobranchial there are 146. In the centre of this length they run forty-five per inch; they are rather closer together at the extremities. They are fairly long, but are only in length one-third of the depth of the gill-laminæ below them. The gill-laminæ in this fish, however, are very long. The inner edges of the gill-rakers carry a number of minute bristles. There are numerous gill-rakers on the inner and outer faces of the other arches; they slope over to meet each other, and their extremities touch in a well-defined line. The filter formed is a very close one. The faces of the pharyngeal bones are very much curved, the lower one being curved with long gill-rakers lying all across it. The mucous membrane of the upper pharyngeal bones has, as stated before, numerous cilia-like processes that evidently would help in separating edible organisms when undergoing the triturating action that the structure of the upper and lower pharyngeal bones seems so adequately adapted to perform.

Mugil capito, the Grey Mullet, has numerous—one hundred or more—horny gill-rakers on the first cerato-hypobranchial, the longest about half the depth of the gill-laminæ below it; there are seventy-two on the first epibranchial. The inside of the first, both sides of the second, and the outside of the third arches have a number of similar but shorter gill-rakers very closely set, and these form a very efficient filter. The inside of the third and outside of the fourth have an edging of still shorter gill-rakers. The gill-rakers are very brittle; their inner edge is serrated. The upper pharyngeal bone in this, as in the rest of the *Mugilidæ*, is quite differently formed structurally from this bone in other fishes. The mucous lining of the upper pharyngeal bone is similar to that of the last described fish.

CHÆTODONTIDÆ.

Heniochus macrolepidotus, from the Indian Ocean. The gullet of this fish is very small, and the gill-rakers minute. No pharyngeal teeth could be seen or felt in either upper or

lower part. The place of the upper pharyngeal teeth is occupied by ribbed mucous membrane.

OSTRACIONTIDÆ.

Ostracion gibbosus, one of the Trunk fishes, so-called from the horny, rigid case that envelopes them; this specimen came from the Indian Ocean. It has eight short, horny, upstanding gill-rakers on the outside of the first branchial arch. There are only four of these arches. On the inner side of the first arch there are twelve gill-rakers, similar to those on the outer side. The other arches bear gill-rakers, and they all form a close filter. The gill-laminæ are long for the size of the fish, and the longest of them in depth is some six times the length of the longest gill-raker. There are no pharyngeal teeth discernible, either upper or lower.

Ostracion nasus has nine short, horny, upstanding gill-rakers on the outside of the first branchial arch, with fifteen on the inner side. No pharyngeal teeth discernible.

TETRODONTIDÆ.

Tetrodon leopardus, one of the "Puffers" or Globe-fishes, so called from their being able to puff themselves out with air till they assume a globular appearance. This specimen came from the Indian Ocean. It has ten soft gill-rakers on the first branchial arch, seven being on the cerato-hypobranchial portion, and three on the epibranchial. The other arches have tubercles on them that stand out distinctly. There are only three gill arches in this fish on each side. There are no pharyngeal teeth. The mucous membrane of the mouth at the back is divided into three distinct sections on the site usually occupied by the pharyngeal teeth in other fishes. The upper section is covered with corrugations that run in an up-and-down direction; the other sections have minute papillæ. Nothing but lining mucous membrane is observable on the floor of the gullet.

Tetrodon reticularis, from the Indian Ocean, has thirteen soft, papillæ-like gill-rakers on the first cerato-hypobranchial, not growing in a defined row, but scattered along it; some are longer than the others. On the inner side of the first arch and on the other arches there are the same kind of gill-rakers

growing in two rows. This fish, like the last, has only three gill arches. The back of the gullet is divided into three distinct parts. In the upper part, on its outer corners, there are horny corrugations arranged more or less vertically (fig. III., 3). The two lower sections stretch as two bands across the pharynx. The floor of the gullet is covered with mucous membrane, studded with papillæ.

GONORHYNCHIDÆ.

Gonorhynchus greyi has fifteen long horny gill-rakers on the first cerato-hypobranchial with twelve on the first epibranchial arch; the longest about $\frac{6}{7}$ of the gill-filament below it. The other arches have many similar but shorter gill-rakers that lie across the gill slits and make a very perfect filter. There are no pharyngeal teeth, upper or lower. There is a group of strong conical teeth at the root of the tongue, which engage against two plates of similar teeth on the pterygoid bones. These seem adequate to perform any function that the absent pharyngeal teeth would perform. An "uvula" like body, a lobe of mucous membrane, hangs down from the roof of the palate in front of the pterygoid plates; it is stiff, but seemingly admits of folding backwards.

NOTES AND QUERIES.

A V E S.

Egyptian Nightjar (*Caprimulgus ægyptius*, Licht.) in Malta.—On March 14th I found at the Valletta Market a specimen of this rare bird. It was taken the day before by a sportsman from Binghisa. This is the third specimen which I have seen in the flesh; the other two were taken at Wied Zembak in the spring of 1911 by Dr. G. Cachia Zammit. Besides these, I know of nine other specimens taken in the island, three of which are in the collection of Colonel J. L. Francia, who found them, together with three other specimens, in the Market during the spring about ten or twelve years ago. Another specimen, which is unfortunately in a very bad state of preservation, is to be seen in our Natural History Museum. As with many other specimens, this bears no data; it might be, however, one of the three specimens mentioned by Giglioli in the 'Iconografia dell' Avifauna Italica,' June 11th, 1879, which, according to Dr. A. A. Caruana, were taken in the island during the spring of 1876. Very probably Dresser alludes to these three specimens when, in Part 1 of his 'Manual of Palearctic Birds,' p. 435, he says that the species has occurred three times at Malta.—G. DESPOTT.

Bartram's Sandpiper in Ireland.—A few years ago my cousin, the late Mr. J. S. Ellis, of Wardhouse, Co. Leitrim, asked me to examine a bird which he had shot some time previously. I recognised it as probably being a Bartram's Sandpiper, and on a further examination it proved to be certainly of this species. Mr. Ellis gave me full particulars about it. He shot it at Bunduff, Co. Leitrim, in November, 1901, as well as he could remember, in a field quite close to the sea. He showed me the exact spot, and described the curious tameness of the bird, which would suggest that it had recently arrived. When I first saw it, it was in an unfortunate condition. It had been sent to be mounted by some third-rate man, and had suffered at his hands. In addition to this, Mr. Ellis had taken it from him, on account of delay, before the work was completed, and it was still covered with the taxidermist's threads. It has since come into my possession, and everything possible has been done to preserve it, but much of the damage was irreparable. In the case of so rare a

bird it is unfortunate that it should not have been recognised and recorded at once. However, I not only had from Mr. Ellis himself a description of the circumstances in which it was taken, but afterwards it passed direct from his possession into mine. It has since been examined by Mr. Wm. Eagle Clarke, of the Royal Scottish Museum. Mr. Ellis was quite certain of the month in which he shot it, but was hardly so certain of the exact year. This makes the third occurrence of this species in Ireland, the other two also being in the autumn.—J. M. McWILLIAM (Craigmores, Bute).

Further Notes on Newton's Statements on Birds.—I should like to supplement my notes on some statements by Professor Newton in his 'Dictionary of Birds' ('Zoologist,' 1915, p. 182). Referring to the Stonechat, p. 918, he remarks that the cock of this species is "a conspicuous object on almost every furze-grown heath or common in the British Islands"—a statement not at all in consonance with what is now known of its status during the breeding season. In many, if not most, parts of Yorkshire, and other places in Britain which were at one time considered as eminently suitable breeding haunts for this species, it is found to be exceedingly rare if not altogether absent, as will be seen by a reference to the 'Zoologist,' 1901, p. 64, and the 'Naturalist,' vols. 3 and 4, 1877-8.

With reference to the Redshank, Newton states: "Before the great changes effected by drainage in England it was a common species in many districts, but at the present day there are very few to which it can resort for the purpose of reproduction." This species, at least in some parts of Yorkshire—and there are good reasons to believe this applies to other parts of England as well—breeds much more commonly than was the case formerly, and it by no means at this season confines itself to marshy grounds; on the contrary, it often nests in dry situations at some distance from very marshy ground.

Does Newton wish it to be understood that the Lesser Redpoll is almost wholly insectivorous in summer? If so, I think he is mistaken. It may not, however, be so exclusively a seed-eating species as the Linnet, but still I think it largely feeds on seeds in summer.

The Swift, in the speed of its flight, "apparently exceeds that of any other British species," so the Professor states, a statement, I think, which it would be difficult to prove. A few years ago the late Alfred Walker, of the Bradford Scientific Society, and myself had many rambles in the Yorkshire Dales for the purpose of ascertaining the flight-speed of birds, and we found that the flight of the Swift was by no means so swift as is popularly believed. Indeed we found the flight of

many species of birds much quicker than the Swift's, which was quite a revelation to me. The flight of the Heron and Rook was much quicker, and the flight of the Swallow much slower, than I had previously thought. I am sorry that I have not at hand a table of time-flights which we took on the above occasion, but as far as I remember, the Grouse, which we timed on Barden Moor in Wharfedale, was the swiftest-flying species we noted.

An interesting feature in the economy of the Woodcock is recorded by Newton, viz. that the old birds transport their newly-hatched young, presumably to places where food is more accessible—a fact which was long doubted if not disbelieved by even eminent naturalists. Many years ago I was with the late Mr. Soppitt, of the Bradford Naturalist Society, on the banks of Windermere, and we actually saw a Woodcock carrying one of its young in the manner described by Newton; but we both believed, and had good grounds for our belief, that the parent was transporting its young not so much on account of lack of food for the young one as to put it in a place of safety.

The Wheatear does not constantly put its nest under the ground as is asserted. Indeed for a good radius from this place it nearly always builds its nest in an old wall, sometimes in the ground, but not nearly so often in the latter place as in some other districts I have visited.

Is the Starling to be considered as a late breeder, as is alleged by Newton? The most that one can say is that this species breeds somewhat later than some of our resident birds, but some Finches and Buntings are decidedly later breeders than the Starling.

In a footnote to p. 968 of the 'Dictionary of Birds,' Titmice are cited as great benefactors to horticulturists, and the accusation that they do a deal of damage to fruit-trees by destroying the buds is called wholly false. As far as the Blue Tit is concerned, with the most charitable intentions, I could not construe the behaviour of this species amongst fruit-trees and bushes as wholly of an innocuous character. The other species of Titmice I do not regard as deleterious to fruit-trees.

Referring to the distribution of the Chiff-chaff, p. 1052, the statement that this species "is very numerous in the southern and western part of England, but seems to be scarcer northward," broadly stated may be quite true, but a reference to its status in many parts of its range in England must be governed by factors other than latitude and longitude. Here, in mid north-west Yorkshire, it is

almost unknown as a breeding species, and is much commoner in some parts further east and even north.

From my limited knowledge of the nesting-habits of the Lesser Whitethroat I have always thought it affects not the thickest foliage, as Newton states, but the more open country lanes and gardens.

Speaking of the Sparrow in its economic aspect, Newton opines that if a fair investigation could be carried out the conclusion would be unfavourable to the Sparrow—a conclusion which would probably be endorsed by most ornithologists. It should, however, in fairness be stated that the Sparrow is almost exclusively insectivorous during the summer months—particularly is it passionately fond of the “daddy-long-legs,” whose larvæ are so destructive to the roots of grasses. Indeed, when they are to be obtained, its young are mostly fed on these insects, and no other British bird conduces so largely to keeping them within reasonable limits.—E. P. BUTTERFIELD.

GASTROPODA.

Notes on Land Mollusca in Wiltshire in 1916.—*Feb. 13th.*—Fovant, near Dinton. The South Downs near here are very encouraging places to work on, mollusca being very numerous; the chalky nature of the land, I think, contributes largely to this. The most abundant species is *Helix virgata*. This species is so numerous that as one walks over the hills it is sometimes impossible to tread without crushing many individuals. Both in size and markings I find *H. virgata* varies considerably. Round the umbilicus the reddish-brown stripes are often interrupted in such a manner as to form patterns and give the shell a chequered appearance. *Helix rotundata*, *H. ericetum*, *H. aspersa*, and *H. nemoralis* (var. *hybrida*), I also found on the northern slopes of the Downs to-day; also *H. arbustorum* and *hispida*, only I am rather doubtful as to the exact identity of these two species. *Feb. 17th.*—As I walked down one of the lanes near Sutton Mandeville this afternoon I thought the decaying vegetation on the banks looked a likely spot, so I raked over the dead leaves in some places, and found several specimens of *Zonites glabra*, *Clausilia rugosa*, and *Vitrina pellucida*. The latter were very delicate and quite transparent, and I found considerable difficulty in removing the animals from their shells. *Feb. 19th.*—To-day I found a *C. rugosa* clinging to the moss on an old Roman wall on Sutton Down. *Feb. 20th.*—Two cast-off shells of *Cyclostoma elegans* on a bank near Teffont Ewyas. *March 13th.*—Deep snow has prevented any collecting this last few days; but to-day I was

again able to get out in search of shells where there was no snow. So I walked towards Sutton Down, and on the banks of a lane found several *Helix cantiana*, *H. rufescens*, and *H. virgata*, two *Bulimus obscurus*, and one *C. rugosa*. March 14th.—Collected some more specimens from the decaying vegetation on the bank of the lane near Sutton Mandeville. I found six specimens of *Helix cantiana* and one *Neritina fluviatilis*. This seems rather strange, as the nearest river is the River Nadder, flowing in the valley at least two miles away.—H. E. J. BIGGS.

INFUSORIA.

Abnormal Reproduction in Stylonychia.—It is a well-known fact that in nearly all the ciliated protozoa, reproduction is effected by division into two daughter-cells, similar in size, and largely so in



FIG. 1.— $\times 120$.



FIG. 2.— $\times 250$.

A, as first seen. B, ten minutes later.

structure. Budding and spore-formation is very uncommon, and is indeed confined to a few groups. For this reason, peculiar interest necessarily attaches to any case in which gemmation can be shown to occur in a species which has been previously held not to be guilty of such a breach of the general rule; as is (to the best of my knowledge) the case with the various species of *Stylonychia*. On December 1st last I was engaged, during an interval between some experiments, in the examination of a number of *Stylonychias*, when my attention was drawn to a large individual which had attached to its posterior end the curious excrescence shown in Fig. 1. The *Stylonychia* was somewhat misshapen and unhealthy, and I naturally at first took the small organism (for such the excrescence proved to be) for a parasite. Closer examination showed, however, that the two organisms were really one. The small one, as can be seen, was pear-shaped, and consisted of granular protoplasm, similar to that of the large individual; there was also a vacuole (v, fig. 1) of con-

siderable size in the large end. Connecting the two organisms (which I shall call for convenience the "macrozoid" and "microzoid") was a band of protoplasm, which could be seen to be in actual continuity with the transparent non-granular cortical layer in both. The microzoid was clothed in short cilia, which were in brisk action; curiously enough, there was no trace of any differentiation into setæ or cirri, the arrangement being entirely holotrichous. The two organisms were kept under close observation, and in about ten minutes' time the connecting band of protoplasm was gradually lengthening and becoming narrower, the microzoid at the same time making convulsive jerks, as though to break away from its parent. In about five minutes more the process was completed; the now thread-like band parted in the middle, the ends shrivelling up, and the microzoid swam rapidly away. I kept it under observation for some time; it swam about broad end foremost, and very quickly. I did not see it ingest any food, nor alter in shape or size. In about twenty minutes after the completion of division I was obliged to leave the microscope, so I cannot say what finally became of it. The macrozoid also was alive at the end of the twenty minutes, and was seen to ingest food. For such an extraordinary method of reproduction I can give no reason. I have mentioned that the macrozoid looked unhealthy; is it possible that it was in some way diseased, and unable to effect complete division? (Here I may mention that it appears common for *Stylonychias* to break into irregular fragments, some of which may continue to live for some time, and possibly even regenerate; anterior portions are most frequently seen.)—R. D. GREENAWAY.

NOTICES OF NEW BOOKS, Etc.

A Veteran Naturalist. By E. W. RICHARDSON. London: Witherby & Co. 1916. 10s. net.

BOTH the author and the publishers of this excellent biography of the late W. B. Tegetmeier may fairly claim to be considered public benefactors for putting on record the virile, upright, active life of this fine old naturalist, who died only recently, in 1912, after completing his ninety-sixth year. One of the many well-chosen and interesting illustrations depicts him as we remember him—a small-built, fragile-looking, white-haired old man, whose vivid interest in natural history

in the best sense, and friendly manner to all with whom he came into contact, were the best evidence of the genuineness and goodness of his nature. His was, indeed, a truly British character; for though, as Mr. Richardson (who is, by the way, his son-in-law) tells us, his father was a Hanoverian—in those remote days a British subject under our then comparatively new dynasty—his mother was English, and he did not even know German, or try to get his children to learn it. Eminently a practical scientist, he qualified in medicine and practised it a short time before taking to journalism, and his ornithological studies were especially concerned with such useful birds as poultry, pheasants, and homing pigeons; and as, to get practical results, a man must necessarily be scientific, it is no wonder that he was so useful to Darwin. Bees also received his attention, and he proved that the hexagonal form of the cell develops from a cylindrical one in the course of working, and is not the outcome of design. Both in journalism and outside it, he left a gap that has never been filled; and, as he was the first naturalist whose work attracted our then juvenile attention, and the one we always respected most, we have a personal pleasure in heartily welcoming this able and sympathetic book.

The Fauna of British India. Rhynchota, Vol. VI. Homoptera, Appendix. By W. L. DISTANT. London: Taylor & Francis. 1916.

THIS worthy member of a brilliant and useful series contains numerous additions in the way of new species and genera to the previous volumes on the Indian insects of this group. Some idea of the richness of the Indian region may be formed by Mr. Distant's opening paragraph: "In volume III, 149 species of Cicadidæ were enumerated and described as found in this Fauna. I am now able to add 23 more species, bringing up the total to 172." Many new forms of the extraordinary little *Membracidæ*, so conspicuous by their thoracic excrescences, are also described, of which the most remarkable are *Hypsauchenia kemp*i, with its scimitar-shaped vertical horn as long as the body, and *Anchonoides typicus*, in which, besides two lateral horns, there is a central one bending over and joining the back at its tip, thus forming an actual handle—surely a unique structure among animals.

ERRATUM.—On p. 160, line 3, for "possessing the," read "possessing two."

